

REMARKS

Claims 1-3, 10, 12-18, 22 and 23 were rejected. Claims 1, 12, 18, 22 and 23 are amended and new claims 24-27 added. Support for the amendments can be found throughout the application, for instance at pages 6 (line 34), 12 (lines 18-20), 14-15 and 34 (line 9) of the specification as originally filed. No new matter is added. Claims 1-3, 10, 12-18 and 22-27 are submitted for further consideration. Applicants respectfully request reconsideration and withdrawal of all rejections.

Claim Rejections - 35 U.S.C. § 112, Second Paragraph

Claims 1-3, 10, 12-18, 22 and 23 were rejected as being indefinite. Applicants respectfully point out that this rejection is moot in light of the claim amendments indicated herein. Applicants urge withdrawal of all rejections.

Claim Rejections - 35 U.S.C. § 102

Claims 1-3, 12, 13 and 23 were rejected under 35 U.S.C. §102(b) as anticipated by Klug et al. It is alleged that Klug et al. discloses azeotropic compositions and their use as blowing agents for polyurethanes and polyolefins, in accordance with the compositions of the present invention.

Applicants respectfully disagree. Applicants point out that in one preferred embodiment the present invention is concerned with the technical problem of providing for azeotropic or near azeotropic foaming agent compositions that are suitable for use as substitutes for CFC 11 to give a homogeneous foam having a density of about 30 kg/cm³.

For example, in one embodiment the present invention is related to a process for foaming polyurethane polymers and thermoplastic polymers, the process comprising adding to compositions used to make solid polymers azeotropic or near azeotropic foaming agent compositions as substitutes for CFC 11 to give a homogeneous foam having a density of about 30 kg/cm^3 , the compositions based on difluoromethoxy-bis(difluoromethyl ether) and/or 1-difluoromethoxy-1, 1, 2, 2-tetrafluoroethyl difluoromethyl ether.

No such invention is taught or suggested by Klug et al. Applicants respectfully point out that Klug et al. contains absolutely no teaching or suggestion regarding foaming compositions comprising hydrofluoroether and hydrocarbon or hydrofluorocarbon that are suitable for use as a substitute for CFC 11, that is, compositions capable of giving a homogeneous foam having a density of about 30 kg/cm^3 . Applicants point to the Declaration of Dr. Giampiero Basile, submitted with the response of December 5, 2000, as clearly demonstrating that the compositions of Klug et al. provide for foams having a density higher than 30 kg/cm^3 , contrary to the present invention (See Tables 1 and 2). Therefore, in that the Klug et al. reference is unable to teach or suggest each and every element of the present invention, in particular a foam density of about 30 kg/cm^3 , Applicants urge withdrawal of the rejection.

In light of the discussion and amendments above, Applicants respectfully submit that the present invention is in condition for allowance.

In view of the amendments and remarks above, Applicants respectfully submit that this application is in condition for allowance and request reconsideration and favorable action thereon.

In the event this paper is not considered to be timely filed, Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300, referencing Attorney Docket No. 108910-09024.

Respectfully submitted,

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Enclosures: Marked-Up Copy of Claim Amendments
Petition for Extension of Time

MARKED-UP COPY OF CLAIM AMENDMENTS

1 (Amended). A process for foaming polyurethane polymers and thermoplastic polymers, comprising: adding to compositions used to make solid polymers azeotropic or near azeotropic foaming agent compositions as substitutes for CFC 11 [,] to give a homogeneous foam having a density of about 30 kg/cm³, said foaming agent compositions based on difluoromethoxy-bis(difluoromethyl ether) and/or 1-difluoromethoxy-1, 1, 2, 2-tetrafluoroethyl difluoromethyl ether, said foaming agent compositions selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-pentane	1-95 99-5
II) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); iso-pentane	1-99 99-1
III) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); dimethyl ketone (acetone)	1-60 99-40
IV) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc)	1-99 99-1
V) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa)	1-40 99-60

VI)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); methoxymethyl methylether	1-96 99-14
VII)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-hexane	30-99 70-1
VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-pentane	1-93 99-7
IX)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] dimethyl ketone (acetone)	30-99 70-1
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-hexane	15-99 85-1
XI)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] ethyl alcohol	5-99 95-1
XII)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc) a hydrocarbon selected from n-pentane or isopentane	1-64 98-1 1-35 and

XIII) difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H);	1-22
1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa)	98-43
a hydrocarbon selected from n-pentane or isopentane	1-35

wherein

- (1) in the foaming agent compositions II, III, IV, V and VI, up to 40% by weight of the difluoromethoxy-bis(difluoromethyl ether) is optionally substituted with 1-difluoro methoxy-1,1,2,2-tetrafluoroethyldifluoromethyl ether;
- (2) in the foaming agent [compositions IX and X] composition IX, up to 40% by weight of 1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether is optionally substituted by difluoromethoxy-bis(difluoromethyl) ether;
- (3) in the foaming agent compositions I and VII, up to 50% by weight of difluoromethoxy-bis(difluoromethyl ether) is optionally substituted by 1-difluoromethoxy-1,1,2,2-tetrafluoroethyldifluoromethyl ether;
- (4) in the foaming agent compositions VIII and X, up to 50% by weight of 1-difluoromethoxy-1,1,2,2-tetrafluoroethyldifluoromethyl ether is optionally substituted with difluoromethoxy-bis(difluoromethyl) ether.

12 (Amended). The process according to claim 1, wherein for polyurethane foams the compositions are selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H);	1-95
n-pentane	99-5

II)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); iso-pentane	1-99 99-1
IV)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc)	1-99 99-1
V)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa)	1-40 99-60
VI)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); methoxymethyl methylether	1-96 99-14
VII)	difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-hexane	30-99 70-1
VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-pentane	1-93 99-7 and
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-hexane	15-99 85-1

[and

A)	difluoromethoxy-bis (difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-pentane	62% by wt. 38% by wt.
B)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); iso-pentane	63% by wt. 36% by wt.
D)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); 1,1,1,3,3-pentafluorobutane ($\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_3$, HFC 356 mfc)	60% by wt. 40% by wt.
E)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); 1,1,1,4,4,4-hexafluorobutane ($\text{CF}_3\text{CH}_2\text{CH}_2\text{CF}_3$, HFC 356 ffa)	20% by wt. 80% by wt.
F)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); methoxymethyl methyl ether	59% by wt. 41% by wt.
G)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-hexane	75% by wt. 25% by wt.
H)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-pentane	61% by wt. 39% by wt. and
L)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-hexane	74% by wt. 26% by wt] .

18 (Amended). The process according to claim 1, wherein for thermoplastic foams the compositions are selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-pentane	1-95 99-5
II) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); iso-pentane	1-99 99-1
III) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); dimethyl ketone (acetone)	1-60 99-40
VII) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-hexane	30-99 70-1
VIII) 1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-pentane	1-93 99-7
IX) 1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] dimethyl ketone (acetone)	30-99 70-1
X) 1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-hexane	15-99 85-1

XI)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether <u>(HCF₂OCF₂CF₂OCF₂H);</u> <u>[(HCF₂OCF₂OCF₂H);]</u> ethyl alcohol	5-99 95-1
XII)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc) a hydrocarbon selected from n-pentane or isopentane	1-64 98-1 1-35 and
XIII)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa) a hydrocarbon selected from n-pentane or isopentane	1-22 98-43 <u>1-35</u>

[and

A)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-pentane	62% by wt. 38% by wt.
B)	difluoromethoxy- bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); iso-pentane	63% by wt. 36% by wt.
C)	difluoromethoxy- bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); dimethyl ketone (acetone)	42% by wt. 58% by wt.
G)	difluoromethoxy- bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-hexane	75% by wt. 25% by wt.

H)	1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-pentane	61% by wt. 39% by wt.
I)	1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); dimethyl ketone (acetone)	79% by wt. 21% by wt.
L)	1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-hexane	74% by wt. 26% by wt. and
M)	1-difluoromethoxy-1,1,2,2-tetrafluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); ethyl alcohol	95% by wt. 5% by wt.]

22 (Amended). Thermoplastic polymer [Polyurethane] compositions comprising the foaming compositions selected from the [foaming compositions] group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-pentane	1-95 99-5
II) difluoromethoxy bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); iso-pentane	1-99 99-1
III) difluoromethoxy bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); dimethyl ketone (acetone)	1-60 99-40
VII) difluoromethoxy bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-hexane	30-99 70-1

VIII)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether <u>(HCF₂OCF₂CF₂OCF₂H);</u> [(HCF ₂ OCF ₂ OCF ₂ H);]	1-93 99-7
IX)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether <u>(HCF₂OCF₂CF₂OCF₂H);</u> [(HCF ₂ OCF ₂ OCF ₂ H);] dimethyl ketone (acetone)	30-99 70-1
X)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether <u>(HCF₂OCF₂CF₂OCF₂H);</u> [(HCF ₂ OCF ₂ OCF ₂ H);] n-hexane	15-99 85-1
XI)	1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether <u>(HCF₂OCF₂CF₂OCF₂H);</u> [(HCF ₂ OCF ₂ OCF ₂ H);] ethyl alcohol	5-99 95-1
XII)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc) a hydrocarbon selected from n-pentane or isopentane	1-64 98-1 1-35 and
XIII)	difluoromethoxy-bis (difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa) a hydrocarbon selected from n-pentane or isopentane	1-22 98-43 1-35

[and

A)	difluoromethoxy-bis (difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-pentane	62% by wt. 38% by wt.
B)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); iso-pentane	63% by wt. 36% by wt.
C)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); dimethyl ketone (acetone)	42% by wt. 58% by wt.
G)	difluoromethoxy- bis(difluoromethyl ether) ($\text{HCF}_2\text{OCF}_2\text{OCF}_2\text{H}$); n-hexane	75% by wt. 25% by wt.
H)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-pentane	61% by wt. 39% by wt.
I)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); dimethyl ketone (acetone)	79% by wt. 21% by wt.
L)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); n-hexane	74% by wt. 26% by wt. and
M)	1-difluoromethoxy-1,1,2,2-tetra- fluoroethyl difluoromethyl ether ($\text{HCF}_2\text{OCF}_2\text{CF}_2\text{OCF}_2\text{H}$); ethyl alcohol	95% by wt. 5% by wt].

23 (Amended). Polyurethane polymer compositions comprising [Thermoplastic polymer compositions containing foaming agents, said] foaming agents selected from the group consisting of:

	composition % by weight
I) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-pentane	1-95 99-5
II) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); iso-pentane	1-99 99-1
IV) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,3,3-pentafluorobutane (CF ₃ CH ₂ CF ₂ CH ₃ , HFC 365 mfc)	1-99 99-1
V) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); 1,1,1,4,4,4-hexafluorobutane (CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa)	1-40 99-60
VI) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); methoxymethyl methylether	1-96 99-14
VII) difluoromethoxy bis(difluoromethyl ether) (HCF ₂ OCF ₂ OCF ₂ H); n-hexane	30-99 70-1 and
VIII) 1-difluoromethoxy 1,1,2,2-tetrafluoroethyl difluoromethyl ether (HCF ₂ OCF ₂ CF ₂ OCF ₂ H); [(HCF ₂ OCF ₂ OCF ₂ H);] n-pentane	1-93 99-7
X) <u>1-difluoromethoxy</u> <u>1,1,2,2-tetrafluoroethyl</u> <u>difluoromethyl ether</u> <u>(HCF₂OCF₂OCF₂H);</u> <u>n-hexane</u>	<u>15-99</u> <u>85-1</u>

[and

- | | | |
|----|---|------------------------------|
| A) | difluoromethoxy-bis
(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
n-pentane | 62% by wt.
38% by wt. |
| B) | difluoromethoxy-
bis(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
iso-pentane | 63% by wt.
36% by wt. |
| D) | difluoromethoxy-
bis(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
1,1,1,3,3-pentafluorobutane
(CF ₃ CH ₂ CF ₂ CH ₃ , HFC 356 mfc) | 60% by wt.
40% by wt. |
| E) | difluoromethoxy-
bis(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
1,1,1,4,4,4-hexafluorobutane
(CF ₃ CH ₂ CH ₂ CF ₃ , HFC 356 ffa) | 20% by wt.
80% by wt. |
| F) | difluoromethoxy-
bis(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
methoxymethyl methyl ether | 59% by wt.
41% by wt. |
| G) | difluoromethoxy-
bis(difluoromethyl ether)
(HCF ₂ OCF ₂ OCF ₂ H);
n-hexane | 75% by wt.
25% by wt. |
| H) | 1-difluoromethoxy-1,1,2,2-tetra-
fluoroethyl difluoromethyl ether
(HCF ₂ OCF ₂ CF ₂ OCF ₂ H);
n-pentane | 61% by wt.
39% by wt. and |
| L) | 1-difluoromethoxy-1,1,2,2-tetra-
fluoroethyl difluoromethyl ether
(HCF ₂ OCF ₂ CF ₂ OCF ₂ H);
n-hexane | 74% by wt.
26% by wt.] |